BERMUDA

REPORT

of the

DEPARTMENT

of

AGRICULTURE

for the year

1936

IMPERIAL MYCOLOGICAL
30 AUG. 1937
INSTITUTE

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Board of Agriculture, 1936.

Hon. G. S. Patton, M.C.P., Chairman
Wor. B. C. C. Outerbridge, J.P., M.C.P., Deputy-Chairman
Hon. W. J. H. Trott, M.C.P.
Mr. E. J. Moniz
Mr. W. S. Cooper, M.C.P.
Mr. J. H. Hollis
Mr. H. T. North, M.C.P.
Mr. J. E. P. Vesey, M.C.P.
Mr. A. J. Gorham.

Department of Agriculture, 1936.

Director of Agriculture, T. A. Russell, B.Sc., A.R.C.S., A.I.C.T.A., Dip. Agr. (Cantab).
Plant Pathologist, (from 17th September), J. M. Waterston, B.Sc., (Edin.) A.I.C.T.A.
Agricultural Assistant, W. R. Evans.
Inspector of Produce, T. Arthur Hollis.
Clerk, (till 30th Sept.) Hilda C. Lines
(from 22nd June) Nora E. Hollis.

PART-TIME OFFICERS.

Government Veterinary Officer, C. J. Cooper, V.S.
Assistant Inspector of Produce, C. V. S. Early.
Sub-Inspectors of Produce, A. W. B. Fowle, J. W. M. Gibbons.

LETTER OF TRANSMISSAL

Agricultural Station,
Paget East, Bermuda
6th July, 1937.

Sir,

I am directed by the Board of Agriculture to lay before His Excellency the Governor, for the information of the Legislature, the accompanying reports of the Department of Agriculture for the year ended 31st December, 1936.

I have the honour to be,

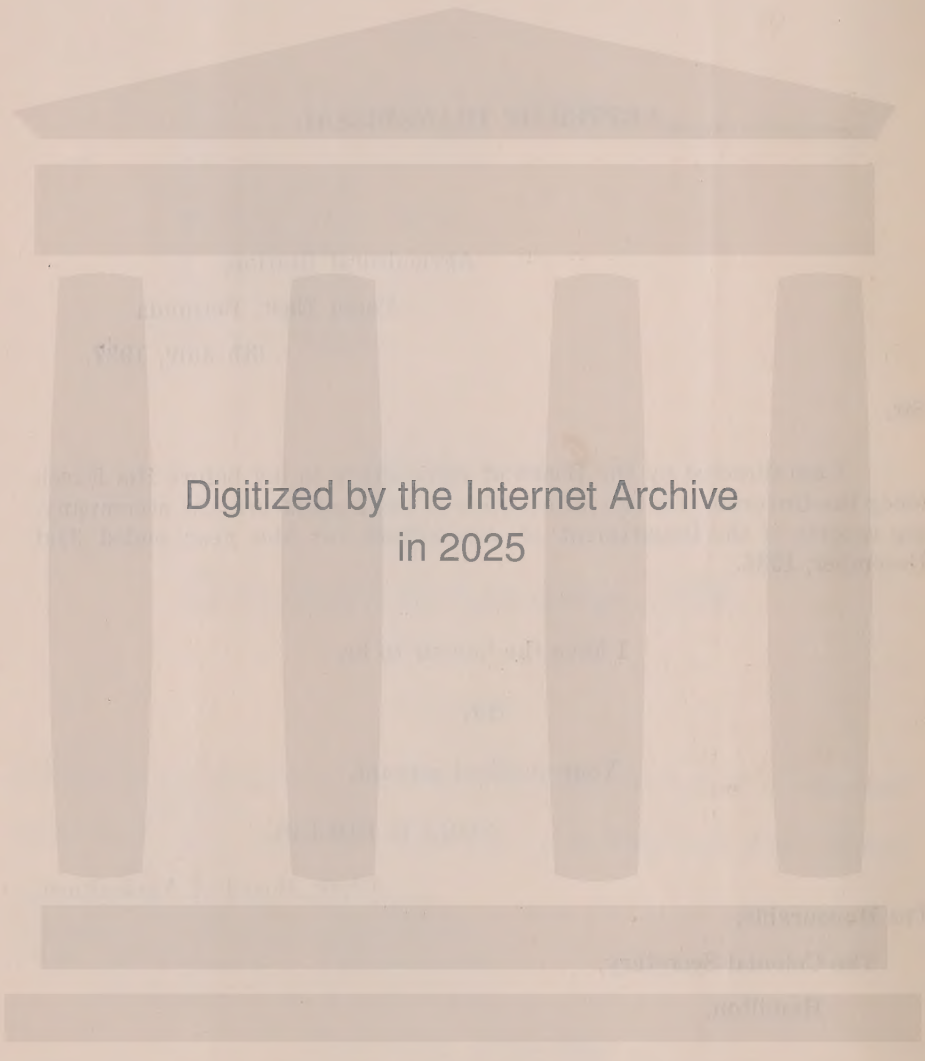
Sir,

Your obedient servant,

NORA E. HOLLIS,

Clerk, Board of Agriculture.

The Honourable,
The Colonial Secretary,
Hamilton.



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Report of the Director of Agriculture, 1936.

The Chairman,
Board of Agriculture.

I have the honour to submit reports of the Department of Agriculture for the year 1936.

AGRICULTURE IN 1936.

Weather conditions were on the whole favourable to the growing of crops and there was a rather notable absence of winds strong enough to cause damage. The rainfall was unusually high in the early months of the year, but as a result of a long dry spell in July and August and a shorter one in October, the total rainfall for the year was little above the average for the past five years. (See Appendix B: Rainfall Recorded at Agricultural Station). Most of the crops yielded normally, a conspicuous exception being the early-planted Chili Garnet and White potatoes which were wiped out by Phytophthora blight.

So far as the export market was concerned, the year under review was the most disastrous of which we have record. The terms of the trade agreement between Canada and the United States, under which vegetables from the United States were permitted entry at significantly reduced rates of duty, came into force on 1st January 1936. As a result much heavier supplies of vegetables were forwarded to the Canadian market than in previous years and the effect was soon apparent to the Bermudian grower in the poor demand and lowered prices which greeted his produce. In the matter of customs tariffs he is in a worse position than ever before. The high-tariff policy, which caused him the loss of the valuable market in New York, gave him protection in the Canadian market; but this protection has now been greatly reduced with no corresponding lowering of duties on Bermuda's vegetables entering the United States. Under the Imperial Preferential Policy however, vegetables from Bermuda still enjoy free entry into Canada if shipped direct by Canadian steamship, and under the terms of Most Favoured Nation Treatment, extended to Bermuda by Canada early in November, produce shipped in bond through the United States may now enter Canada on similar terms with produce of the United States, that is on payment of the Intermediate Tariff.

The local market remains fully protected and with the continued expansion of the tourist-industry is of increasing value. The tendency of the tourist-season to spread into the summer months has brought a greater demand for vegetables at that time of the year. Attempts are being made to utilise pondland more effectively for the summer-cultivation of vegetables, and the possibility of growing crops under irrigation from shallow wells or from fresh-water ponds requires fully to be explored. Extended use might be made of cold storage, but the existing facilities are hardly sufficiently convenient or well-adapted and above all are too expensive for their popular use.

The difficulties of many farmers were multiplied by a shortage of labour. In some parishes efficient labourers were hardly to be had while even the inefficient demanded a wage which few farmers were in a position to pay. The problem is no new one being a result of the continual drift of men from farms to the towns and hotels, where hours may be easier and pay higher. The importation of a few men from the Azores to serve on farms for a fixed period of years, which was authorised towards the end of the year, may be expected to give a small measure of temporary relief: the problem itself is likely to remain until the labouring population has increased sufficiently to fill all the easy jobs and to overflow on to the farms.

The objection is sometimes raised that a disproportionate amount of time and money is expended in fostering an export market for vegetables which brings scant returns, and that this expenditure would be better repaid if it were directed solely towards developing the local market. The importance of the local market should not be, and indeed is not likely to be, forgotten. Every opportunity should be taken to produce vegetables in such quantity and condition as will meet its requirements. But it must be borne in mind that the demands of this market are to a large extent dependent upon a prosperous tourist-business, whereas in the export trade in vegetables and bulbs, small though it be, we have perhaps our only industry which is entirely independent of the tourist-business. In this respect it merits further efforts and keener investigation.

Even amongst those who admit the desirability of keeping alive an export trade in vegetables, there are those who doubt whether this can ever again be prosperous and successful. Increased competition in Eastern Canada spells a period of low prices while the continued expansion of the tourist-business in Bermuda give little prospect of cheaper labour of an efficient type. With our high labour-costs can we still afford to sell at a competitive price? This seems possible only if we can increase our yields per unit of land and of labour and if we can improve the quality of our produce so that it may command the top prices in the market. For these purposes further tests must be made of new crop-varieties and of manures and fertiliser mixtures, of different methods of growing, packing and shipping, and of measures for reducing the heavy losses caused by pest and disease. In short we must try to adopt and apply to our local use the most modern methods of agricultural science with this object ever in mind of placing better produce on the market at less cost to the producer.

The Export Markets. The quantities of vegetables and lily bulbs exported to various countries during the shipping season of 1936 are summarised in the following table. As the season for shipment of potatoes to the United States of America starts shortly before the opening of the

year, this table includes a small quantity of potatoes shipped in November and December 1935.

Commodity	U. K.	Canada	Br.Guiana & B. W. I.	U. S. A.	Other Countries	Total
Beets (bushels)	—	1,877	—	—	—	1,877
Cabbage "	—	5,532	808	—	—	6,340
Carrots "	—	22,959	114	—	—	23,073
Celery "	—	31,870	—	100	—	31,970
Cucumbers "	—	213	—	—	—	213
Kale "	—	—	—	7,347	—	7,347
Onions "	—	10,997	267	11	—	11,275
Parsley "	—	57	—	—	—	57
Potatoes "	136	4,372	283	19,296	—	24,087
Spinach "	—	49	—	—	—	49
Tomatoes "	2	19,607	27	—	—	19,636
Miscellaneous	—	95	—	—	—	95
Total (bushels)	138	97,628	1,499	26,754	—	126,019
Lily Bulbs, (cases)	368	245	3	1,912	50	2,578

The total volume of vegetables at 126,019 bushels compares with 138,476 bushels in 1935, a decrease of more than twelve thousand bushels, and represents almost exactly 50% of the average quantity of vegetables exported in the previous ten years.

Potatoes declined more than any other vegetable, partly through failure of the early spring crop, and tomatoes, carrots, and cabbage also fell off. On the other hand larger quantities of celery and onions were grown and shipped as a result of encouraging returns from these vegetables the previous season. There was again a small increase in the number of lily bulbs exported.

Significant as was the decline in volume, it was small compared with the fall in returns from the sale of the produce. The estimated returns to Bermuda from the sale of agricultural produce (excluding cut-flowers) in various countries, arrived at by substracting freight-charges and selling-costs from the gross receipts, are as follows:

Country of Export	Estimated Value of Return. 1935.	1936.
Canada	£35,200	£17,100
United States of America	8,900	11,400
United Kingdom	900	1,000
British West Indies & B. Guiana	600	200
Other Countries	100	100
	£45,700	£29,800

The Canadian Market. Reference has already been made to the changes made in the Canadian customs tariff under the Canada-United States Trade Agreement, which had the effect of drastically lowering the protection previously granted to vegetables from Bermuda. This was reflected in the smaller volume of vegetables shipped to Canada, 97,627 bushels in 1936 as against 108,178 bushels in 1935. But, since most of the vegetables were sown before the new tariff came into effect and were shipped in spite of the changed situation, the effect is not so evident in the quantity exported as in the returns which it brought back. The estimated returns to Bermuda for produce sold in Canada, £17,100, represent only 49% of the corresponding figure for 1935 (£35,200).

In the following table the average price per crate at which each major commodity was sold is compared with corresponding prices in the four preceding seasons .

Commodity	1932	1933	1934	1935	1936
Beets, per crate	$1.57	$1.57	$1.31	$1.72	$1.43
Cabbage "	2.33	1.73	1.92	2.33	1.50
Carrots "	1.89	1.43	1.40	1.54	1.23
Celery "	2.74	1.90	2.40	2.33	2.07
Onions "	1.67	1.06	1.31	2.06	0.73
Potatoes "	1.86	1.75	1.62	1.47	2.27
Tomatoes "	1.49	1.61	1.90	1.60	1.16

It will be seen that with the single exception of potatoes which fetched an unusually high price owing to an acute shortage in Canada, all the vegetables sold at a price considerably below the general level of the past four years.

If the cost of crate and charges for packing, ocean-freight, any land-freight, and brokers' commission are substracted, it is possible to obtain some idea of the return to the farmer for produce selling at the prices quoted above in the column for 1936.

Commodity	Calculated Return to Farmer
Beets, per crate.....	2/8d.
Cabbage "	2/-
Carrots, "	2/3
Celery, "	4/-
Onions, "	1/-
Potatoes, "	6/7
Tomatoes, "	2/9

As in previous seasons, produce was shipped only to Messrs. J. Hunter White Ltd., St. John, New Brunswick: Messrs. J. W. Gorham & Co., Halifax, Nova Scotia; and Messrs. Mutual Brokers Ltd., and Messrs. Marshall and Morrison Ltd., in Montreal. These brokerage firms co-operated closely with the shippers of produce and with the Department and this opportunity is taken of gratefully acknowledging their assistance and efficient service.

The following table indicates the distribution of shipments to the three ports.

Commodity	Halifax	St. John	Montreal	Total
Beets (crates)	641	938	298	1,877
Cabbage "	1,282	1,456	28	2,766
Carrots "	7,667	10,016	5,276	22,959
Celery "	748	1,919	13,268	15,935
Cucumbers "	24	74	115	213
Onions "	2,910	4,073	4,014	10,997
Parsley "	19	35	3	57
Potatoes "	53	54	3,710	3,817
Potatoes (barrels)	—	—	185	185
Spinach (crates)	8	21	20	49
Tomatoes (lugs)	6,283	8,653	39,647	54,583
Tomatoes (crates)	90	513	810	1,413
Miscellaneous	7	60	34	101
Total (packages)	19,732	27,812	67,408	114,952

It will be noted that most of the potatoes, celery and tomatoes went to Montreal while beets, cabbage and carrots found their chief market in the Maritimes.

The chief difficulty in connection with selling produce in Canada is the infrequent means of placing it on the market. From the end of April onwards for example, there is only a fortnightly service from Bermuda to the Maritimes ports so that a heavy shipment is made once a fortnight. Since this cannot be disposed of immediately in the relatively small markets of Halifax and St. John, there is almost invariably some loss and decay before all can be sold. In this respect Bermuda is at a very great disadvantage compared with sources of supply connected by rail, which can make smaller consignments on much more frequent occasions.

The United States Market. The only vegetables shipped to the United States of America in significant quantity were potatoes and Portuguese kale, and the total volume of 26,754 bushels was less than that of any year of which we have record with the exception of 1935 (23,759 bushels). Potatoes for New York continued to be shipped chiefly in barrels but a small proportion was shipped in bushel-crates to meet the requirements of a certain portion of the trade. A small consignment of potatoes in crates was shipped to the port of Boston.

The sale of Easter lily bulbs in the United States showed a small decline compared with that of the previous year.

Other Export Markets. Small experimental shipments of new potatoes were made to England with fair success. The method of growing and results obtained are described under the section "Work of the Department".

Small quantities of cabbage, carrots, onions and potatoes were sold in British Guiana and in some of the British West Indian islands.

The Domestic Market. Thanks to a most prosperous tourist-season, there was an increased local demand for vegetables. The poor export market had the effect of further enhancing the value of local sales in the eyes of the growers. An increased number peddled vegetables on the roads and to some at least this proved a profitable outlet. The Farmers Market was well supplied with vegetables and was well patronised.

Although store-keepers insist that the retail selling of vegetables through the Farmers Market prevents them from trading in vegetables through their stores and thus narrows the outlet for local produce, the solution would seem to lie not in abandoning the Farmers Market as they suggest, but in providing a wholesale market, if possible in connection with cold-storage facilities, at which store-keepers could obtain their supplies at prices slightly below those of the retail market.

The Chief Crops. From the point of view of the volume exported, celery headed the list of vegetable crops. In value however it was well exceeded by both the tomato and the potato crops. It is probably correct to say that in the local market the potato crop was by far the most important reckoned both by volume and by value.

Potatoes. It was unfortunate that in a year when potatoes were selling most profitably in Canada the Bermuda crop should partially fail. The Bliss Triumph crop dug in December 1935 and early January 1936 was attacked generally by Phytophthora blight, and the white potatoes and Garnets planted in January followed in far too many cases in the same fields. As a result, part of the second crop was attacked by blight before it had properly emerged from the ground and no amount of spraying could save it. Potatoes planted later than February escaped the epidemic of blight and cropped heavily.

Most of the Bliss Triumph Seed imported in the autumn of 1936 was obtained from Nova Scotia (2,535 barrels) and was of high quality with the exception of one small lot infected with common Scab. A small quantity of seed (500 barrels) imported from Long Island suffered badly from Fusarium or stem-end rot between the time of its arrival in Bermuda and the date of planting. A crop of average volume was reaped from seed of both sources.

Tomatoes. The main crop of tomatoes was very late and the first shipment to Canada of any size was not made till 2nd June. Between 16th June and 1st July there were four heavy shipments totalling over 42,000 crates, but after the latter date the quantity reaped fell steeply as a result of dry weather. The quality of the crop was inferior to that of former years, and on account of increased shipments from other sources the market was much slower than usual. The largest shipment of 13,309 crates made on 1st July was unfortunate enough to arrive on a glutted market and to be sold at a low price.

During the four previous seasons, although the prices of other vegetables sagged, the tomato-crop returned a good profit to the grower. In 1936 this also proved undependable. One of the worst features of a bad season was the concentration of heavy pickings over a very short period of time. In former years larger shipments have been made earlier as well as later, and the marketing of the crop has been spaced out over a longer season. The short span of the crop may have been due to the particular conditions of weather prevailing during this season, but the possibility has also to be considered that the growers throughout these islands are not spreading out their plantings sufficiently but are tending to plant all the crop about the same date.

Celery. The area of land planted with celery showed an increase in 1936 and, while a portion was spoilt by Septoria blight, the greater part of the crop was of high quality. Unfortunately it found a poor market and sold at little profit.

Other Vegetables. Following the unusually high prices given for onions in Canada in 1935 and in spite of the warnings of the Department that this was unlikely to be repeated a second year, there was an increase in the average of onions planted. The crop was poor in quality and only a portion of it found a sale. Carrots and cabbage also received such poor prices in Canada that in some instances growers who found they could not sell locally preferred to leave the crop to rot in the field rather than to risk making shipment abroad.

Bananas. The importance of the banana crop is seldom realised in Bermuda, possibly because it is all consumed locally and does not figure in tables of exports. Except in the summer months when there tends to be rather a glut in the market, bananas usually sell at very fair prices when the ease with which they are produced is taken into consideration.

Easter lilies (*Lilium longiflorum var eximium*: trade name *Lilium Harrisii*).

The lily bulb industry has not so far shown any great response to the returning prosperity in the countries where sales are made. The total exports, which amounted to 7,611 cases in 1928, fell to 2,014 cases in 1933 and by 1936 had only recovered to the extent of 2,578 cases. The movement though disappointingly small is however in the right direction and there are grounds for hoping that it will be increasingly maintained. In addition to the trade in bulbs, some lily-growers find a useful source of revenue in the sale of the cut-flowers.

The following table shows the number of cases of lily bulbs exported in the past five years.

Year	Exports
1932	3,009 cases
1933	2,014 "
1934	2,309 "
1935	2,490 "
1936	2,578 "

The area planted to lilies has followed closely the volume of the sales as shown by the figures below.

Year	No. of Growers	Area in Acres
1932	107	44.0
1933	70	33.0
1934	61	20.2
1935	51	24.3
1936	53	26.5

The area planted in the autumn of 1936 for the 1937 crop is estimated at 28.4 acres, thus showing a further small increase.

As usual, all fields were inspected at least twice during the growing-season by the Department, and certificates authorising the sale of the bulbs were granted only to those growers whose fields satisfied the requirements of the Department with respect to disease. The only troubles of importance were the virus disease known as yellow flat or rosette, whose presence in many fields called for the constant attention of growers, and the condition known locally as "twist", the cause of which has not yet been properly

explained. One small plot of lilies was burnt up by Botrytis blight (*B. elliptica*), a disease formerly of much importance but now rarely seen in Bermuda. Possibly as a result of dry conditions for some time before digging, there was a tendency for the bulbs to be smaller than the size of the plant had led one to expect. They were for the most part firm and heavy and of good appearance.

There was a small decrease in the sale of bulbs in the United States of America, from 1,948 cases in 1935 to 1,912 in 1936. This was more than balanced by an increase in sales in Canada, to which country 245 cases were shipped as against 127 in 1935 and 64 in 1934. The interest now being shown in Canada is largely attributable to the successful results of tests of these bulbs made by the Department of Agriculture at Ottawa, and the assistance given by the Dominion Botanist and Dominion Horticulturist is gratefully acknowledged.

Messrs. Robert Tucker & Co. continued their active supervision of sales in the United Kingdom and on the Continent of Europe. The situation in these markets is described in the valuable report written by this firm which is reproduced as Appendix A. In spite of a significant reduction made in the price of the bulbs during the past season there was a relatively small increase in the quantity sold (368 cases in the United Kingdom during 1936 as against 334 cases during 1935). This to some extent confirmed the impression already held that the sale of this type of lily is limited not so much by its price as by its not entirely meeting the requirements of the bulk of the trade.

The successful shipment of lily bulbs wrapped in waxed paper instead of being packed in sand is worthy of note. The idea was that of Mr. Malcolm Hollis, and, as it makes an appreciable saving in the freight-charge, it is worth investigating further. It seems unlikely however that bulbs will keep their good colour and appearance for such long periods of time in paper as in sand.

As in former years Mr. Lawrence Ogilvie put his exceptional knowledge of the Bermuda lily at the service of Messrs. Robert Tucker & Co. and of nurserymen growing these lilies in the United Kingdom, and this opportunity is taken to express the indebtedness of the growers in Bermuda to him for his continued interest and assistance.

Milk. In Bermuda as in most other countries milk is the most valuable crop produced. Indeed it has been calculated that the value of the milk sold in Bermuda falls not far short of half the value of all the farm-produce consumed locally. Its value moreover is to be measured not merely by the revenue which it brings back to the farm, for as progress is made in nutritional research the value of milk to the consumer becomes increasingly stressed.

When we regard milk in its true place as our most important agricultural product, it becomes evident that the subject of milk-supply has not been given the attention which it merits. The question of producing milk that is clean and safe to drink has been tackled and there has followed the compulsory testing of cows against tuberculosis before their milk can be sold. But the proper feeding of cows under local conditions, the possibility of growing greater supplies of good feed locally, and the economics of milk-production have not been fully investigated.

Comparison of the estimated production of milk in Bermuda with the figures of population, both resident and visiting, shows that the consumption per head of population is very small. Indeed it is probably the case that a large section of the community never uses fresh milk. Moreover it never will while the price of fresh milk remains at its existing height. Producers on the other hand affirm that while they have to import much of their feed it is impossible to retail milk at a lower price.

In other words it seems probable that if means could be found for selling milk at a cheaper price while still permitting the dairyman to make his fair profit, a greatly increased demand for fresh milk would result. Furthermore the possibility has to be considered that the use of milk by the labouring classes might be followed by a general improvement in health and vigour. In view of the value of the milk business both to producer and consumer, the development of this branch of farming would seem to be a fundamental need of local agriculture.

Other Animal Products. Pork and veal are produced locally but most other forms of meat including poultry are imported. The supply of local eggs is seasonal and, as large quantities continue to be imported, there seems a good opportunity for further development of the poultry business in Bermuda.

The production of honey also remains only partially developed and there seems little doubt that a large potential market for local honey exists. In the hope of stimulating interest in bee-keeping and of drawing attention to the opportunities which it offers, three meetings were arranged during May and June. At these, Major J. S. Bartrum very kindly talked on various aspects of bee-keeping in Bermuda, his remarks being intended chiefly for the beginner and being accompanied by practical demonstration.

The attendance was small but it was agreed that the meetings were of value and worth continuing in future seasons.

WORK OF THE DEPARTMENT.

The year under review was again one of great difficulty for the Department through vacancies and changes in the staff. The vacant post of Plant Pathologist remained unfilled till the month of September, the Department was without a Horticulturist throughout the year, and the Clerk resigned and a successor was appointed at the end of June. The remaining members of the staff had to take over what extra work they could, and this was done loyally and uncomplainingly.

The main activities of the Department are outlined in the following pages.

Government-Packing of Vegetables. As a result of the poor demand for vegetables in Canada during the early months of the year, the requirements of the brokers in Halifax and St. John were exceeded by shipments of farm-packed produce. In order not to encourage over-supplying, the Government packing-houses were not opened for general use until the season was well advanced. The Packing-House at the Agricultural Station was opened to receive vegetables for the first direct shipment to Montreal on 21st April, and the shed at Evans Bay (for all vegetables except celery and tomatoes) was put into use on 10th May. Both tomato-sheds at the Station were used from 1st June onwards and for part of the time were working at full capacity. In the period of five days, 16,500 boxes

or nearly 150 tons of fruit were packed and during this rush space in the sheds for stacking the fruit brought in from the fields proved inadequate. All three packing-houses were closed on 4th July.

On account of the late opening of the packing-houses, the proportion of vegetables for Canada packed by the Government was smaller than in the three previous years. The actual number of crates was 71,437 representing 72% of the crates of vegetables, exclusive of celery, shipped to Canada. Of the crates of tomatoes exported, 93% was Government-packed.

As in previous years, the cost of packing was not covered by the charges made to growers, and indeed the decline in the number of crates packed resulted in a smaller proportion of the cost being covered by the charges.

Marketing Service. Owing to the several changes and vacancies in the staff of the Department, it was not considered feasible for the Agricultural Assistant to be out of the country during the actual shipping-season, although he was able to make a preliminary survey of the markets in January. For the first time in several years no officer was stationed in Canada to supervise the marketing of produce on arrival there. The Department kept in touch as closely as possible by letter and telegram with each of the official brokers, and advised growers and shippers to the best of its ability as to prospects and prices and the most promising allocation of shipments to the three ports.

The possibility of selling new potatoes in England was given further consideration. In accordance with the opinion previously obtained that only potatoes of Kidney type were likely to satisfy the English trade, small quantities of Royal Kidney and also of King Edward seed were imported from the United Kingdom. These were planted at the Agricultural Station and also on one of the farms where they were kept under supervision of the Department. In spite of unfavourable conditions for growth their yield was fairly good, as will be seen from the detailed account in the Report of the Agricultural Assistant.

Three small consignments totalling 120 bushels (approximately 60 cwts.) were shipped to Messrs. Rogers, White & Co., Liverpool. These arrived about the middle of April, the first week in May, and the first week in June, and fetched prices averaging 8/- per bushel, 8/8, and 6/3 respectively. In view of the high cost of shipping to England such prices are barely good enough to interest the grower in Bermuda, but they are at least sufficiently promising to justify further investigation of the market.

A few crates of Katahdin potatoes which reached Liverpool early in January were well received and sold for 10/- per bushel. A few boxes of tomatoes sent at the same time arrived in bad condition and proved unsaleable.

Advisory Service. In addition to advising on the marketing of produce, members of the Department gave advice on the cultivation of crops, the time for planting, varieties worth growing, and the control of diseases and pests.

A survey was made of a large part of the cultivated land with the main object of providing information as to the supply and conditions of

employment of agricultural labour. A summary of its findings are included in the Report of the Agricultural Assistant.

Inspection and Regulatory Services. The Department was responsible for the administration of Byelaws regulating the following:

(i) Control of Animal Diseases. The Government Veterinary Officer examined all domestic animals landed in the Colony with a view to checking the introduction of serious disease. From the figures shown in detail in his report, it will be noted that there was an increase in the importations of livestock and poultry.

In continuation of the joint scheme of the Board of Health and Board of Agriculture for the control of bovine tuberculosis, the Government Veterinary Officer tested cattle for this disease throughout the Colony with the exception of Somerset. The test, which is made free of charge, is compulsory in the case of cows supplying milk for sale and is voluntarily taken advantage of by many private owners of cows, so that the cattle tested, numbering 1449 in 1936, represent a high proportion of the cattle in these islands. Those which reacted positively to the test were slaughtered, compensation being paid by the Government.

Cattle in three parishes were tested for Bang's Disease with the object of obtaining information as to its occurrence. The only other disease of importance amongst livestock recorded by the Government Veterinary Officer was an outbreak of Septicaemia Haemorrhagica amongst pigs, which caused the loss of one herd but did not spread further.

(ii) Control of Plant Diseases and Pests. With the object of assisting the more efficient control of diseases and pests, a new set of regulations was passed by the Board of Agriculture on 28th April, and was later approved by the Legislature. The main changes affected the importation of plant material and included restrictions on the importation of plants and cut-flowers by air and of soil and plants growing in soil, (both being prohibited unless a special permit has previously been obtained), and a total embargo on sweet potatoes entering from all countries (instead of from all countries except the Lesser Antilles, as formerly). The restriction on the importation of narcissus bulbs was relaxed to permit of their being imported from all countries subject to their being treated suitably against bulb-pests before entry, instead of from Holland only as insisted by former bye-law. A summary of the existing legislation regarding plant importations is attached to this report as Appendix D.

An account of the occurrence of plant diseases and pests and work done on their control from 30th September till the end of the year will be found in the Report of the Plant Pathologist.

It is gratifying to be able to report a very noticeable decline in the attack of the scale *Comstockiella sabalis* on the native palmetto. This appears to be a direct result of the energetic distribution of the two Aphelinid parasites *Physcus sp.* and *Encarsia portoricensis* which has been made during the past three years. It is now extremely difficult to find a palmetto attacked by the scale on which these parasites are not to be seen and, for the present time at least, they seem to have the pest well under control.

Two new power spraying machines were bought during the year to take the place of the two old "Friend" Machines which have been working since 1921. One of the new machines is a 100 - gal. "Empire Leader" spray-cart with 2½ H. P. engine, manufactured by the Field Force Pump Co., New York. The other is a similar model to those which have given such excellent service for the past sixteen years but is fitted with a larger tank, a 150 - gal. machine with 2½ H. P. engine made by the Friend Manufacturing Co., New York.

(iii) Inspection of Produce and of Nursery Stock. Vegetables for export were subjected to inspection, those packed by Government at the packing-sheds, and those packed on the farms at the docks where inspectors were on duty throughout the shipping-season. Any vegetables in which serious defect was noted were condemned. An account of the condition of vegetables at the time of shipment is given in the Report of the Inspector of Produce.

In addition to the inspection of lily fields made by the Plant Pathologist, an inspection of the bulbs at the time of packing was made by the Inspector of Produce. Other plants and bulbs intended for export were examined shortly before shipment, and only such as were found to be free from diseases and pests were passed as fit for export.

(iv) Importation and sale of Seed Potatoes. The Byelaws regulating the importation and sale of seed Potatoes were revised towards the end of the year, the chief alterations making it an offence to use seed-potatoes for table purposes and giving the Board the right to demand information from importer or purchaser regarding the acquisition and disposal of seed-potatoes.

A police prosecution was made under the old regulations against a farmer found peddling seed-potatoes on the road but this failed from lack of evidence as to their ultimate disposal.

Experimental Work. The programme of experimental work was limited by the smallness of the Staff and its pre-occupation with packing and marketing services. Several varieties of tomatoes and potatoes were grown together in plots for purposes of observation and their behaviour is described in the Report of the Agricultural Assistant. The Plant Pathologist made an active start in investigating various diseases and pests of importance, reference to which is made in his report. Work was continued on the breeding of *Lilium longiflorum* and observations made on the occurrence of the unidentified disease known as "twist".

Horticulture. A large number of plants was supplied to Arbor Societies for roadside-planting in various parishes, to schools, and to bazaars in aid of charitable funds. Plants not ordinarily obtainable from florists in Bermuda were sold at a low price to private persons. Advice and assistance were given whenever possible to the Garden Clubs and Arbor Societies. At the request of the Corporation of St. Georges, the Director made suggestions for the improvement of the Somers Garden.

Many requests for advice were received from residents and visitors interested in gardening and, while every effort was made to supply the desired information, in the absence of a trained horticulturist this was not always possible.

A sample of Roman Hyacinths grown at the Agricultural Station was sent to Messrs. Robert Tucker & Co. in August and forwarded by this firm to Messrs. James Carter & Co. for trial. The sample was composed of three lots which had received the following treatments:

Lot 1: from an early planting, bulbs dug in April and stored loose, exposed to air.

Lot 2: from same early planting, bulbs dug in April and stored in sand.

Lot 3: from a later planting, bulbs dug in June and stored loose.

The following report on the three lots made by Messrs. Carter was submitted by Messrs. Robert Tucker & Co.

"Here are the details of culture given to the three lots of Roman Hyacinths you sent us from Bermuda.

These were all potted in 5" pots on September 22nd 1936, in ordinary potting soil and stood in a cold frame—

LOT 1.— These showed a tendency to grow slightly quicker than the others, but only threw up its flowering spikes about a week earlier than Lots 2 and 3. When in full bloom could not be compared to Lot 3 for quantity and quality of flower.

LOT 2.— Started much the same as No. 3, but was very much inferior in quantity of bloom. This lot also showed a certain unevenness and irregularity in flowering.

LOT 3.— Practically every pot was perfect and gave a very fine show indeed. All the bulbs bloomed together, stems were fat and stiff and carried an average of 3 spikes per bulb. In my opinion No. 3 was the best sample of Roman Hyacinth I have seen for years. As you know we exhibited them at the Royal Horticultural Society's Show on January 12th and many interested people remarked on the high quality of the bulbs.

My test was made under ordinary conditions and without any other heat than that necessary to keep out frost".

The Director, while on leave in England, had the opportunity of seeing these bulbs which were exhibited at the show and was impressed by the very fine exhibit they made. There seems little doubt that, if this standard of excellence could be maintained, a good demand for these bulbs could be created in the United Kingdom.

Office Work. The clerical work, involving correspondence on agricultural and departmental matters, the keeping of financial accounts, and the keeping of records in connection with Government-packing, was performed efficiently. Both the retiring Clerk and her successor deserve credit for their able work. Letters received during the year numbered 900 and those despatched 1060.

The Agricultural Bulletin which completed its fifteenth year in 1936 was issued each month, and was distributed not only in the Colony but also to Departments of Agriculture and other institutions in many countries.

A scientific paper written by the Director, "Diseases and Pests of Tomatoes in Bermuda", was published in the journal "Tropical Agriculture".

A large number of publications was received from Departments of Agriculture and Colleges in many parts of the world, and this opportunity is taken gratefully to acknowledge them.

The Agricultural Station. The grounds were kept tidy and improvements were made as circumstances permitted. The roads and buildings were maintained in good repair.

(1) Vegetable Plots. The vegetable plots were cropped in some cases three times in others four times during the year. On all plots soybeans were planted in the summer and ploughed in as green manure. Farmyard manure was applied to the plots either before or after the soybean crop.

In the following table are indicated the crops grown on the various plots:

	Winter and Spring	Summer	Autumn
North Field Plot 1	cabbage & broccoli, Kidney Potatoes	soybeans	potatoes
Plot 2	tomatoes, Kidney potatoes	"	lilies and potatoes
South Field Plot 1	potatoes, corn (forage) carrots	"	carrots
Plot 2	Kidney potatoes, tomatoes	"	Kidney potatoes
Plot 3	misc. vegetables, Kidney potatoes	"	cabbage, broccoli and tomatoes.
Rosebank	Onions, Kidney potatoes tomatoes.	"	cow peas.

The Kidney potatoes were grown for trial shipment to England, while most of the other crops were grown as varietal tests or for plant pathological work. A portion of the vegetables obtained was supplied to government institutions, such as the hospital and the gaol, the rest being used for experimental shipments to various markets.

(ii) Ornamental Plots. In absence of a Horticulturist the Station Foreman was responsible for the upkeep and propagation of the ornamental trees, shrubs, and flower-plants. Under his care there was a very fine show of annuals, Antirrhinums and Phlox Drummondii being exceptionally good.

The collection of native plants of Bermuda being made in the small garden between the main Exhibition buildings was added to as opportunity occurred. Little progress was made in the labelling of the plants, and the projected guide-book to the Station still remains unwritten.

The Department is indebted to various individuals and to other Departments for gifts of seeds, and in this connection special mention is due to Mr. A. S. Patterson formerly of Melbourne, Australia, and to Mr. John S. Dean of Victoria, British Columbia.

(iii) The livestock at the Station was limited to the old cow Juliet of Montrose, her great-grand-daughter Jane, which calved on 11th January and again on 30th December, and the imported cow Amazon of Ware, all registered Guernseys.

(iv) The Station was visited by a large number of people including residents as well as tourists, and many expressed interest in the work being done and in the collection of plants.

Distinguished visitors included His Excellency the Governor of Bermuda and Lady Hildyard; the Colonial Secretary, Hon. A. G. Grantham and Mrs. Grantham; Lady Gilbert-Carter, Barbados; Mr. W. D. Lambie, British Trade Commissioner for the West Indian Area; Mr. D. S. Cole, Canadian Trade Commissioner in New York and Mrs. Cole; Mr. A. W. Baker, Professor of Entomology, Ontario Agricultural College, Guelph; Mr. H. F. Eberhein, Freight-Traffic Manager, Furness-Bermuda Line, New York; Mr. J. M. Lupton, seed-grower, Long Island; Dr. and Mme. Weill, Paris; Messrs. D. Welch and P. Posnette, Colonial Agricultural Scholars, Trinidad; and many others.

The Exhibition grounds were lent to the Military Command for a Horse Show and Gymkhana held on 12th March.

STAFF.

Mr. T. A. Russell, Director of Agriculture, was absent from the Colony on duties connected with the marketing of vegetables in Canada from 11th to 20th November. In Ottawa he had the privilege of discussing some aspects of the trade between Bermuda and Canada with officials belonging to various departments of the Dominion Government.

Thereafter he was on vacation leave till the end of the year.

Mr. J. M. Waterston was appointed to the Department on 17th September to fill the post of Plant Pathologist which had been vacant for nearly a year. He arrived in Bermuda to take up his duties on 29th September. Mr. Waterston received his training at Edinburgh University, afterwards taking postgraduate courses as a Colonial Office Scholar at the University of Cambridge and the Imperial College of Tropical Agriculture, Trinidad.

Mr. W. R. Evans, Agricultural Assistant, acted as Director from 12th November till the close of the year. Mr. Evans was absent from the Colony from 8th January till 7th February during which period he attended the Conference of the Canadian Fruit and Vegetable Jobbers Association at Toronto, and also surveyed the prospects of marketing potatoes in New York and vegetable produce in Upper Canada and the Maritimes.

Mr. T. A. Hollis, Inspector of Produce, in addition to his inspecting duties was largely responsible for the efficient running of the Government Packing-houses. He was on vacation leave in Bermuda from 5th to 26th October.

Miss Hilda C. Lines, Clerk to the Board and Director, went on vacation leave for twelve weeks on 1st July and resigned from the Department on 23rd September following her marriage. Miss Lines served the Board and Department as Clerk for eight years with outstanding efficiency and conscientiousness. In addition to her ordinary departmental duties she was responsible for much of the clerical work and book-keeping in connection with several of the Agricultural Exhibitions and in connection with the Government-packing of vegetables.

Miss Nora E. Hollis joined the Department on 22nd June to fill the position of Clerk to the Board and Director.

Dr. C. J. Cooper, Government Veterinary Officer, was on vacation leave from 8th to 22nd October, during which period he visited the United States of America. In his absence his official duties were performed by Dr. J. W. Sutherland, B.V.Sc.

Mr. C. V. S. Early, Station Foreman, was in charge of operations on the station grounds and was responsible for the propagation and care of ornamental plants as well as of vegetable crops. During the shipping-season he acted as Assistant Inspector of Produce.

Messrs. A. W. Fowle and J. W. M. Gibbons acted as Sub-Inspectors when required at the Packing-houses and docks. In addition to his inspecting duties, Mr. A. W. Fowle was responsible for part of the clerical work in connection with the receipt and discharge of vegetables at the Government Packing-houses.

FINANCIAL.

The expenditure of £3460. 15. 0. in Personal Emoluments was authorised by the Appropriation Act of 1935, and by Supplementary Resolve No. 4 of 1937 and of this sum £2,626. 9. 8. was expended. The sum of £7062 was appropriated for other purposes by the Appropriation Act of 1935 and by Supplementary Resolves Nos. 28 of 1936 and 4 of 1937, and £5999. 16. 4 was spent. Reimbursements to the Treasury for charges made for packing vegetables and for the sale of vegetables and plants amounted to £1,813. 5. 2. The nett expenditure of the Department, exclusive of Personal Emoluments, was therefore £4,186. 11. 2. As will be seen from the table which follows, the gross expenditure in 1936 was the lowest in any year since 1929, though as a result of decreased reimbursements for packing services, the nett expenditure was rather higher than in 1935.

Year	Gross Expenditure	Reimbursements	Nett Expenditure
1927	£ 4,409 19 5	£ 346 2 4	£4,063 17 1
1928	4,038 12 7	157 10 8	3,881 1 11
1929	4,184 6 10	193 0 1	3,991 6 9
1930	6,500 16 2	247 18 9	6,252 17 5
1931	6,984 18 9	280 1 1	6,704 17 8
1932	6,745 2 4	466 7 1	6,278 15 3
1933	10,191 17 0	2,434 9 7	7,757 7 5
1934	9,905 10 11	2,409 6 9	7,496 4 2
1935	6,570 16 10	3,163 18 11	3,406 17 11
1936	5,999 16 4	1,813 5 2	4,186 11 2

In addition to these departmental votes, financial assistance was given by the Government to agriculture by the payment of a subsidy from votes of the Trade Development Board to provide increased facilities for the shipment of vegetables.

Respectfully submitted,

T. A. RUSSELL,

Director of Agriculture.

22nd April 1937.

Report of the Plant Pathologist, 1936.

1st October to 31st December.

The Director of Agriculture,

I have the honour to submit the following report of work done on Plant Diseases and Pests during the three months from the date of my arrival here to the end of the year 1936.

The greater part of my time has been occupied in a preliminary reconnaissance of the islands in which I have made myself acquainted with the many problems awaiting investigation.

Of these the following appeared to merit immediate attention. Among vegetable crops, the sources of infection of the blights of both potatoes and celery and the control of the fungus (*Sclerotinia sclerotiorum*, (Lib.) de Bary), responsible for the decay of carrots and other vegetables during storage. Chief among the diseases of the lily, the transmission of mosaic and the nature of "twist" a disease of economic importance, require determination.

Bermuda by virtue of her geographical position, possesses an environment which offers favourable opportunities for the employment of methods of biological control against insect pests. Examples of successful introductions which can be cited are the Coccinellid *Rodolia cardinalis* Muls. from the United States of America in 1899 and 1902 in the control of the Cottony Cushion Scale *Icerya purchasi* Mask.; *Aphelinus diaspidis* How. from Italy in 1921 in the control of Oleander Scale *Aulacaspis pentagona* Targ.; *Physcus* sp. and *Encarsia portoricensis* How. from the United States of America in 1926 and 1929 in the control of Palmetto Scale *Comstockiella sabalis* Comst.

Opius humilis Silv. introduced from Hawaii in 1926-1927 for the control of the Mediterranean Fruit Fly *Ceratitis capitata* Wied., has become established although it is doubtful whether it plays any significant part in the control of this pest.

The successes achieved in the past warrant further investigations on the possibility of the introduction of other parasites.

OFFICE AND ADVISORY WORK.

Correspondence in connection with plant pathological matters and advisory work reached a total of thirty-eight letters during the period under review. Records were also kept of the incidence of diseases and pests.

Several alterations have been effected in the laboratory and the equipment maintained in good order.

Advice has been given to farmers on the control of diseases and pests of crops, and also to gardeners in connection with flowering plants and fruit trees. The control of diseases and pests attacking crops and ornamental plants on the Station grounds was supervised.

PROBLEMS INVESTIGATED.

Palmetto Scale. A further improvement is to be recorded this year with regard to the control of the scale *Comstockiella sabalis* Comst., on the Palmetto *Sabal bermudana* Bailey, by *Physcus* sp. and *Encarsia portoricensis* How.

During the period under review, twenty-eight separate infections were examined throughout the island and in every case the parasites were found to be well established. Towards the end of the year, however, it was observed that the parasites tended to lag behind the scale in its advance into the central leaves of the palm. The rapid increase in the numbers of the scale appeared to be correlated with an unusually long spell of warm dry weather during this period.

Advice was given where necessary on the trimming of severely attacked palms. In a few cases where the bud itself was infected, the complete removal of all diseased leaves coupled with wiping the bud with kerosene oil emulsion, was found beneficial.

Diseases and Pests of the Bermuda Cedar, *Juniperus bermudiana* L. A brief survey of the native cedar in Bermuda showed that local patches of diseased trees were distributed throughout the island. The largest areas were found in Devonshire, Smith's and Warwick parishes. Characteristic symptoms observed were the death of the shoots from below upwards. The disease was worse on poor scrub-like growth than on the larger trees, and an encouraging feature was the recovery of trees even in exposed situations.

It was not found possible to attribute the poor condition of the trees to any one factor; poor soil, exposure to wind and salt spray, over-crowding, competition with other vegetation together with the presence of several species of insects, mites and fungi, all contributed to the disease complex.

The cedar scale, *Chrysomphalus agavis* Ths. & Ckll. was frequently although not invariably found associated with the diseased patches. In many cases the exit holes of the parasites *Aphelinus diaspidis* Havard and *Aspidiotiphagus citrinus* Crawford were present.

Among the various fungi found associated with diseased twigs, the cedar rust, *Gymnosporangium bermudianum* (Farl.) Earle was observed to cause the death of those portions distal to the point of infection. An experiment conducted with a species of *Pestalozzia* (P. *funerea* Desm.) isolated from the leaf scales of diseased twigs showed that seedlings of *Juniperus bermudiana* were killed when the leaves were wounded previous to spraying with a spore suspension of the fungus. Check plants with undamaged leaves remained healthy after being sprayed.

A great improvement in the condition of the cedars is to be observed on those few estates in Bermuda where thinning and pruning operations have been carried out.

English Royal Kidney Tuber Index Test. A potato tuber index test was started in November in co-operation with a seed potato grower in Nova Scotia with the object of assisting him in the formation of a foundation seed plot. All plants from the 212 tubers planted remained healthy during the period under observation.

INSPECTION SERVICES.

The number of plant importations examined by me during the period under review reached a total of 157. The total for the year was the highest on record as the following figures show:

Year	No. of Consignments Examined at Post Office and Docks.
1932	262
1933	269
1934	257
1935	300
1936	318

The task of inspecting the plant importations is becoming increasingly arduous and occupies much valuable time. The largest consignments consisted of strawberry plants and palms from the United States of America. The number of importations contrary to regulations intercepted was 18 and consisted of eleven of narcissi, six of lilies and one of carrots. One parcel of gladioli infested with thrips was treated with hot water before being passed and one of hollyhocks infected with rust was destroyed. Scale insects and mealy-bugs were the chief pests intercepted on plants from the West Indies and the United States, and twenty-two consignments were fumigated before being passed.

Need for New Fumigation Chamber.

In connection with fumigation I should like to point out that the present fumigating chamber in use at the Agricultural Station is inadequate, not only in size but also with regard to its site. The present chamber is too small. One twice the present capacity is required and its construction arranged so that it could be partitioned and its capacity altered according to the amount of fumigation to be done. The present position of the chamber at the Station detracts greatly from the value of fumigation in preventing the introduction of pests. The correct position for such a chamber is undoubtedly on the dock-side where plant material can be treated with minimum loss of time after being unloaded. The longer the delay after unloading the greater will be the opportunity for the dissemination of introduced pests.

Inspection of Potatoes in the Field. A general tour of inspection of the Bliss Triumph crop was carried out in the western half of the island in company with the Agricultural Assistant on November the 6th. Only a trace of leaf roll was recorded and all fields were remarkably clean and free from Virus diseases.

Inspection of Seed. Celery Seed imported for sale was examined for the presence of *Septoria apii – graveolentis* Dorogin. Two samples were found to be free from blight, Maule's Golden Self Blanching Strain and Vaughan's Golden Plume Celery Seed. One sample of Paris Yellow Old Strain (from Messrs. Vilmorin, France) had a 2½% infection.

SPRAYING SERVICES.

Two spraying machines were maintained in good service throughout the year, one at Southampton and the other at the Station. They were in

use for 110 days compared with 125 days last year and were employed mainly with the potato, tomato and celery crops and occasionally on citrus, oleanders, palmettoes and other ornamental trees and shrubs.

Hand dusters kept at the Station were hired out when requested and a stock of oil emulsion was maintained for distribution when required.

DISEASES AND PESTS OBSERVED DURING THE PERIOD.

The Weather. The weather during the period under review was unusually mild and dry and favoured insect pests rather than fungal diseases. Cutworms, *Feltia* sp. and fire-worms *Xylomiges* sp. caused widespread damage to potatoes, beans and beets during the summer months. Mealy-bugs and scale insects preponderated and the weather conditions encouraged local outbreaks of Oleander Scale, *Aulacaspis pentagona* Targ.

As a result of the dry weather there was no late blight recorded on the potato and celery crops during December and very little Lettuce Drop (*Sclerotinia sclerotiorum*, (Lib.) de Bary).

Among the lily diseases, there was a reduction in the incidence of yellow flat and there was little stump-rot (*Phytophthora parasitica* Dastur). A marked increase was recorded in the incidence of the disease known locally as "twist" which is characterised by a distortion and yellowing of the upper leaves, and appears to be aggravated by dry conditions.

On Vegetables.

Beets. The fire worm, *Hymenia fascialis* Cram., took its usual toll of this crop during the autumn months.

Cabbage. The looper caterpillar, *Phytometra brassicae* Riley, was not as destructive as usual.

Black-rot, *Bacterium campestre* (Pam.) EFS., was observed during the autumn but did not cause extensive damage.

Carrots. Attack by the fungus *Sclerotinia sclerotiorum* (Lib.) de Bary, was noted in a badly weeded field during December. It is planned to try out various soil treatments in an attempt to control the incidence of this fungus in the field.

Celery. Early Blight, *Cercospora apii* Fres. appeared early in November in a few areas but no Late Blight, *Septoria apii – graveolentis* Dorogin, was observed during the period. The worst insect pest recorded was *Halticus citri*, Reut.

Lettuce. Lettuce Drop, *Sclerotinia sclerotiorum* appeared during December. The varieties New York and Big Boston were found to be more susceptible than the Iceberg.

Virus. A few plants were found infected with Aster Yellows.

Potatoes. Virus. The autumn Bliss Triumph crop was singularly free from virus diseases.

Dry Rot *Fusarium oxysporum* Schl., was found present in samples of Bliss Triumph seed imported from Long Island, U. S.A . Losses in the field due to this fungus amounted to 2½ barrels out of 8 in one case.

Scab, *Actinomyces scabies* (Thaxter) Gussow was also present in the same shipment to a slight extent.

Early Blight, *Macrosporium Solani* E. & M. was found during November but no Late Blight, *Phytophthora infestans*, Mont. de Bary, was recorded up to the end of the year.

Frost Damage. A consignment of Garnets from Canada was found on arrival to contain tubers which gave evidence that they had been frosted in the field. Cobblers from the same shipment showed no signs of injury.

Wind Damage. A case of severe wind damage was observed during December on a crop of New Brunswick Triumphs. The plants were characterised by ring-shaped wounds below the surface of the ground and by the formation of red tuberised buds in the aerial portions.

Tomatoes. Fusarium Wilt, *Fusarium lycopersici* Sacc. A severe case was observed at Southampton during December on Bonny Best, a very susceptible variety. The fault was traced to growing tomatoes repeatedly in the same field without a rotation.

Wind Damage. A wilting of tomatoes grown on Hinson's Island during November was found to be due to mechanical abrasion of the stem. The plants recovered at the onset of wet weather.

ON OTHER PLANTS.

Bougainvillea. Attack by the caterpillar *Gypsochroa stellata* Guen. was frequently observed.

Calendula. Damping-off due to *Corticium solani* Bourd. and Galz., was frequent during October. The use of Formalin or Cheshunt mixture effectively checked this trouble.

Canna. The Leaf-roller *Calpodes ethlius* Cram., was found throughout the island.

Citrus. White Fly, *Dialeurodes citrifolii* Morg. and Purple Scale, *Lepidosaphes beckii* Nerom., were abundant on neglected trees. Spraying with oil emulsion effectively controls these pests. Scab, *Sphaceloma Fawcettii* Jenkins. A severe infection of grapefruit by this fungus is to be recorded from Smith's Parish. It is proposed to carry out a spray programme with 1% Oil Bordeaux mixture.

Coleus. Damage by the mealy-bug *Orthezia insignis* Doug., was widespread during the summer.

Guava. The Guava Shoot Borer *Spilonota smithiana* Wals., is common but few gardeners feel that it is worth their while to take steps to control it. The Mediterranean Fruit Fly, *Ceratitis capitata* Wied., was recorded once during October but has been scarce during the period under observation.

Oleander. The weather conditions during December encouraged a few local outbreaks of Scale, *Aulacaspis pentagona* Targ. which were effectively dealt with by the Department using an oil emulsion spray.

Pittosporum. Attack by the Cottony Cushion Scale, *Icerya purchasi* Mask., was severe on old hedges at Cambridge during October. The Coccinellid predator *Rodolia cardinalis* Muls. was found to be effectively controlling this pest.

Strawberry. The dry weather experienced had an adverse effect on the growth of the plants. In several cases the failure of the plants to become established was due to insufficient watering at the time of planting.

PUBLISHED WORK.

1. A paper entitled "Observations on the Black-stem Disease of Lucerne in Britain" written in conjunction with Mr. F. W. Toovey and Prof. F. T. Brooks was published in the Annals of Applied Biology, Vol. 23, No. 4, November 1936.

2. A paper on "A Note on the Association of a species of Phytophthora with a Die-back Disease of the Raspberry" was read by proxy, before the Botanical Society of Edinburgh on December 17th, 1936.

LECTURE.

At the request of the Secretary of the Sandys Garden Club, a lecture was given on November 4th entitled "Some Beneficial Insects".

ACKNOWLEDGMENTS.

I wish to record my grateful appreciation to all the members of the Department for the kind welcome and helpful assistance given me since the date of my arrival in the colony.

Respectfully submitted,

J. M. WATERSTON,

Plant Pathologist.

10th March, 1937.

Report of Agricultural Assistant 1936.

The Director of Agriculture.

I have the honour to submit my report for 1936.

VEGETABLE FIELD TESTS.

The claims on the time of the Staff in connection with grading, packing and shipping of farmers' vegetables prevented field tests being conducted on a comprehensive scale. Observations were therefore confined to a few varieties of major importance for export.

Bush Beans. Bountiful and Tennessee Green Pod, the favourites of many seasons are still the most popular. Of the two, Bountiful is the most widely used, as it produces a smoother pod which in the young stage is completely stringless, tender and brittle. Tennessee Green Pod is equal to Bountiful in quality of texture, is a little earlier in maturing, but its coarser appearance detracts from its market value. Both varieties are susceptible to mildew and much loss results from its attack. Mildew can be controlled by dusting sulphur if applied in the early stages of growth, but unfortunately few farmers exercise this control method.

Beets. Of the several varieties tested Early Wonder has proved one of the best. It produces a smooth globular-shaped root of even colour and texture. Farmers experience great difficulty in growing beets early on account of fireworm damage. To be successful in growing early beets one must be prepared to dust or spray with arsenicals at frequent intervals.

Broccoli. Since the introduction of the Italian Sprouting variety in 1929 the production for the local market has been increased from year to year. Unlike the white variety of the Cauliflower type it is a sure header and in the opinion of some it has a more delicate flavour than the Cauliflower. Four strains have been tested, but no one strain was found to excel the other. Broccoli finds a ready sale in the local market, but it is one of the most perishable commodities to handle. The flower buds mature and blow open rapidly, and the leaves wilt and turn a yellow colour. Broccoli lends itself very well to quick freezing, and its flavour is said to improve in the process.

Cabbage. The efforts of the Department in finding a cabbage combining suitable export qualities and profitable cropping habits have not yet been completely successful. The Canadian market requires a pointed head cabbage of the Wakefield type. This type seldom crops heavily enough to make it a profitable shipper. The farmer's natural choice is the flat headed variety Succession. This variety usually crops heavily, but it is valued least of all in the Canadian market. Copenhagen Market can usually be depended upon to crop more heavily than Jersey or Charleston Wakefield, and it is a type that can be marketed fairly successfully in Canada.

Carrots. No varietal test of Carrots was made, because it has been fairly well established that the Danvers Half Long variety meets the requirements of the Canadian Market for roots sold by weight.

Tomatoes. A comparative test was conducted in No. 2 plot Southfield during the Spring and early Summer, the normal tomato shipping

season. Four standard varieties were tested, namely Bonny Best, Break O'Day, Master Marglobe and Pritchard. Contrary to our previous results, Marglobe produced the heaviest yield.

The average yield per sq. rod was as follows:

Master Marglobe	307 lbs.
Break O'Day	268 "
Bonny Best	267 "
Pritchard	256 "

Potatoes.

(1) **Fall planting.** Bliss Triumph seed obtained from Long Island, New York, and from Nova Scotia, Canada, was planted in No. 2 plot, North field. This planting and commercial plantings on farms of seed from the same sources, were observed during the growing season.

The Long Island seed was imported by three local dealers from Messrs. J. M. Lupton & Son Inc., who had planted in Long Island virus-free Nebraska stock. The plantings in Long Island were field inspected and passed for certification by the State of New York authorities. When the seed was inspected on arrival in Hamilton there was no visible evidence of any disease, but during the interval before planting stem-end rot developed in some barrels. Apart from the loss sustained from this cause the stock was satisfactory. The percentage of virus observed was small, the average being slightly over one per cent, and the yield was satisfactory.

The Nova Scotia seed was imported by four local dealers and by several individual farmers through a commission merchant. The stock was grown in the Annapolis Valley and North Mountain district of Kings County. The stock was selected from some of the best fields passing the certification requirements of the Dominion Inspection Service. Only a trace of virus was observed, and the yields were satisfactory.

Because of shortage of seed at the end of the planting season about 200 barrels of certified Bliss seed was imported from New Brunswick, Canada. This also cropped satisfactorily though some fields showed up to 7 per cent of mild mosaic.

(2) **Winter planting, English Varieties.** Potatoes of varieties Royal Kidney and King Edward imported from England were planted in No. 2 plot North field on 5th February and dug when 80 days old. Part of the Royal Kidney potatoes were obtained from Messrs. Sutton & Sons, Reading, while the other part and all the King Edward potatoes were obtained by Messrs. Pearman, Watlington & Co. from Messrs. Poupart, London. Phytophthora blight was widespread and unusually destructive in potato plantings during the growing season, but on these potatoes satisfactory control of the blight was obtained by dusting or spraying periodically. King Edward proved more susceptible to Phytophthora blight than Royal Kidney.

Both varieties showed considerable virus infection; the two samples of Kidneys showing 7 per cent leaf roll and 3 per cent mosaic, and the King Edward 3 per cent leaf roll and 9 per cent mosaic.

The planting followed a crop of Bliss Triumph potatoes which had received a liberal dressing of barnyard manure the previous Fall, and none was applied at this planting. Artificial fertilizers of various compositions at the rate of 1200 lbs. per acre were applied as top-dressing before the hills were moulded four weeks after planting.

The following yields were obtained:

Fertilizer used at rate of 1200 lbs. per acre	Yield (calculated for 1 acre) Royal Kidney (Poupart)	Royal Kidney (Sutton)	King Edward (Poupart)
4–8–4	19,040 lbs.	14,080 lbs.	15,040 lbs.
5–8–10	17,600 "	15,200 "	15,200 "
Castor pomace and 4–8–4, equal parts	16,960 "	15,040 "	14,880 "
Castor Pomace	15,680 "	14,880 "	13,120 "
Castor Pomace and 5–8–10 equal parts	15,520 "	14,080 "	13,920 "
Check, no fertilizer	12,880 "	10,768 "	10,400 "

The average yield per acre given by the various fertilizer mixtures in the three cases was as follows:

4–8–4	16,053 lbs.
5–8–10	16,000 "
Castor Pomace and 4–8–4, equal parts	15,626 "
Castor Pomace	14,560 "
Castor Pomace and 5–8–10, equal parts	14,506 "
Check, no fertilizer	11,349 "

The average yield per acre from the plots that received artifical fertilizers was 15,349 lbs. compared with 11,349 lbs. from the check plots.

An increased average yield of 80 bushels per acre was obtained from the plots that received artifical fertilizer at an average cost of £8. 8. 0. per acre for materials and labour. The extra crop obtained from the application of fertilizer had a nominal value of £20 per acre, a nett increase of £11. 12. 0 per acre over that of the check plots.

(3) **Winter planting, miscellaneous tests.**

No. 1 plot South field was planted out on January 18th with 2 barrels of Bliss Triumph potatoes from different sources in Nova Scotia and sample lots of Early Puritan, Early Rose, Garnet Chili and Katahdin. Of the Bliss Triumph potatoes, one barrel was clean while the other was badly infected with Common scab, and this provided a means of testing the result of planting tubers with scab in ground where green manure (Soya beans) had been turned in the previous Fall. Each barrel was planted in two lots one of which was given Castor Pomace as a top-dressing at the rate of 1200 lbs per acre, and the other of which received 5–8–7 in the same manner at the rate of 1000 lbs per acre. The plots receiving the fertilizer-mixture 5–8–7 cropped at the rate of 23,968 lbs per acre compared with 21,376 lbs per acre from the plots that received castor pomace. The resulting crop from both barrels was free from scab.

Phytophthora blight was particularly troublesome during this period. The Early Rose potatoes which are very susceptible to late blight were attacked as soon as they broke ground and they were killed before making any appreciable growth. In the other lots the blight was kept under control only by frequent dusting or spraying.

AGRICULTURAL SURVEY.

During September and October with the assistance of other members of the Department I made a survey of the farms with the view of obtaining information particularly regarding the conditions and supply of labour. The survey was confined to farms of one acre and over using hired labour.

Our investigations revealed a genuine shortage of labour suitable for farm work, and as a result in some instances land which ordinarily would have been cultivated was left to the mercy of weeds.

It was found that a great many men that were imported from the Azores within recent years especially for farm work had drifted away from the farms to other more remunerative and easier occupations. Unless means are found to restrict the migration of imported farm labour to other occupations farm labour problems are likely to continue unabated until the other industries are unable to absorb more.

One of the alarming features of the farming business is the comparatively small number of young men who are managing or assisting to manage farms. The great majority of the farmers are men past their prime of life, and they are not being succeeded by their sons, most of whom find some other type of employment soon after they leave school.

The number of farms included in the survey was 151 with a total cultivated area of 770 acres. Most of this acreage is cropped three times during the year. The largest amount of land farmed by one man was estimated at 31 acres, while the average of the 151 holdings surveyed was 5.1 acres.

In the following table the tenure of the land is given.

Table 1. Ownership of surveyed land:

Farmed by owner	21.9 per cent
" " tenant, straight rental basis	76.8 " "
" " tenant, on shares	1.3 " "
	100.0

It will be noted that over three-quarters of the land is cultivated by farmers on a rental basis. Not many years ago much more farming was done on the share system, and the decline of this system is probably due to the decline in the export market within recent years. The system is difficult to maintain unless the farmer concerned exports his crops exclusively, which is not feasible under present conditions.

The next table deals with the nationality of the 151 farmers or working farm-heads, showing the proportion of the surveyed land farmed by men of the different nationalities and races.

Table 2. Nationality of Farmers or Farm-Heads.

Land farmed by White Bermudians (per centage of whole)	22.5
" " " Coloured Bermudians	6.0
" " " Bermuda-born Portuguese	25.5
" " " Imported Portuguese	41.5
" " " Others	4.5
	100.0

This table shows that 67% of the land surveyed is farmed by men of Portuguese extraction (either imported or born in Bermuda). Only 6% is farmed by coloured Bermudians. No statistics are available for comparison, but it is certain that both white and coloured Bermudians farmed a much larger percentage of the total acreage prior to 1916.

In the following table is given the number of men employed steadily throughout the year on the 151 farms.

Table 3. Employment on Farms surveyed.

Working Farmer or Headman	151
Family help (brothers, sons etc.,) men 30, boys 29 (= 15 men)	45
Imported men	59
Local men	83
	338

Much casual labour is employed in addition to the permanent labour indicated in the above table, but the actual number employed is difficult to assess. Small farmers in particular use much extra help during the shipping-season.

The area of land under cultivation is disappointingly small, and much more good land is available for cultivation. The lack of efficient and inexpensive labour together with the uncertainty of a profitable export market are jointly responsible for the depressed state of farming.

W. R. EVANS,

Agricultural Assistant.

14th April 1937.

Report of the Inspector of Produce, 1936.

I have the honour to submit my report for the year 1936.

GOVERNMENT PACKING OF VEGETABLES.

No. 1 Packing House, at the Agricultural Station, was opened about the middle of April for the receipt of vegetables. Tomatoes, potatoes, carrots and onions were the chief vegetables packed. The Southampton Packing House under the charge of Mr. A. W. Fowle Sub-Inspector of Produce was opened on May 10th, and potatoes, onions and carrots were chiefly packed there. The second tomato-shed, No. 2 Packing House at the Agricultural Station, was opened on June 1st. All three sheds were closed on July 4th, when major shipments ended for the season.

Quantities of vegetables packed. The following table shows the quantities of Government-packed and Farm-packed vegetables shipped from the beginning of the year to July.

Quantities of Vegetables shipped to Canada in 1936.

	Government-packed	Farm-packed.
Beans (crates)	Nil	3
Beets	465	1415
Cabbage	443	2354
Carrots	9634	13362
Celery	Nil	15944
Cucumbers	117	88
Onions	5254	5775
Potatoes (crates)	3196	645
Potatoes (barrels)	Nil	189
Spinach	Nil	49
Tomatoes	53,689	3716
Miscellaneous	62	11
	72,860	43,551

From November 1935 to July 1936 the following were shipped to U. S. A.

	Government-packed	Farm-packed
Celery (crates)	Nil	50
Kale	Nil	2449
Onions	11	Nil
Potatoes (crates)	660	819
Potatoes (barrels)	Nil	5939
	671	9257

Quantities of crates on Hand. At the close of the season the crate material on hand was sufficient to make up:

Bushel crates	26,050
Long-type bushel crates	2,690
Cabbage crates	2,400
Tomato crates	35,300
Bushel bags	5,000

INSPECTION OF FARM-PACKED VEGETABLES.

Mr. C. V. S. Early, Assistant Inspector of Produce, was on duty at the dock throughout the season, and Mr. J. W. M. Gibbons, Sub-Inspector was on duty when required.

Comments on Vegetables shipped.

FARM-PACKED TO NEW YORK:

Potatoes: The Triumph crop was very good with little trouble showing. Garnets were very few this season owing to the heavy planting of Katahdins and Cobblers, the latter of which in some cases cropped very heavily.

Kale: Condition very good, shipments finishing about the end of April.

Celery. A small shipment was made on the 19th February of 50 crates as a trial shipment to New York.

FARM-PACKED TO CANADA:

Beets were fair.

Carrots were not too good owing to the fact that the market was poor and they were held until over-mature. Grading and packing generally poor.

Celery. Throughout the season was quite good with practically no blackheart, grading and sizing generally erratic and poor.

Cucumbers. Were quite good throughout the season.

Cabbage. About the usual standard but one or two shippers were outstandingly good.

Onions. Very poor throughout.

Parsley. Very little shipped.

Potatoes. Triumphs were in good condition. Garnets fair but small. Cobblers and Katahdins both showed blue-eye rot due to blight following wet weather.

Tomatoes. About 6 per cent of the crop was packed by The Hill Company and grading and packing were superior to former years.

PRODUCE REJECTED AT DOCK.

Beets	85	crates
Cabbage	220	"
Carrots	344	"
Celery	280	"
Kale	16	"
Onions	325	"
Parsley	8	"
Potatoes	280	barrels
Potatoes	108	crates
Total	1,666	packages.

This was all picked over and later passed inspection for shipment with the exception of 50 crates Celery.

Appeals. During the month of May there were two appeals made against the Inspector's decision, one in respect of carrots being packed in dirty cases though the produce itself was quite good, the other in respect of cabbage which was showing a great deal of rot and immature heads. The carrots were allowed to be shipped by the referees. In the case of the cabbage, the referees instructed the shipper to pick out the best crates and he was allowed to ship under a different shipping mark, though in the opinion of the inspector this should not have been done.

Supervision of Chill-Rooms. Throughout the season the chill-rooms of steamers were frequently inspected by Assistant Inspector Early, the Sub-Inspectors and myself. Stowage was found to be satisfactory, and the percentage of breakage was small.

SEED POTATOES IMPORTED.

From 1st January to 31st March:

Triumphs from Canada	199	barrels
Cobblers " "	37	"

These potatoes all arrived in good condition.

From 1st August to 31st December:

Triumphs from Long Island	500	barrels
" " Canada	2336	"
Garnets " "	1535	"
Cobblers " "	902	"
" " "	950	bags
Katahdins " "	195	barrels
Kidney " "	165	"

CRATE MATERIAL AND COOPERAGE IMPORTED.

Crate material was inspected on arrival and found to be in good condition. Barrel material was also of good quality.

PACKING HOUSE INSPECTION OF LILY BULBS.

Inspection of bulbs for export commenced on 1st July. Bulbs cropped well, and condition was up to the average, with very few blown. Very little basal rot was to be noticed. The licensed exporters showed great care in grading and selection of the bulbs, and in most instances packing was good.

FARMERS' MARKET

The market was inspected weekly and was found to be quite satisfactory. Prices compared favourably with peddlers' and retail grocers' prices. The market was regularly opened and closed by an official of the Department. For most of the year all the stalls except one were rented.

OTHER WORK.

I made surveys during the crop season and duly reported on the same. At the close of the vegetable packing season I attended to the laying up and lubricating of all grading machinery. I made periodic visits to the three Packing Houses during the summer.

Respectfully submitted,

T. A. HOLLIS,

Inspector of Produce.

3rd March, 1937.

Report of the Government Veterinary Officer, 1936.

The Director of Agriculture,

I have the honour to submit my report for the year 1936.

Local Outbreak of Infectious Diseases. There was an outbreak of Septicaemia Haemorrhagica in a herd of swine in Paget, and in spite of treatment the whole herd of 56 died. The outbreak was confined to the one herd.

Importation of Animals. The following domestic live stock were imported:

Horses	291	Increase of	145
Mules	1	" "	1
Dairy Cattle	54	" "	20
Pigs	58	" "	50
Poultry	16,908	" "	6,730
Dogs	305	" "	78
Goats	3	" "	3
Miscellaneous	528	Decrease of	449

Visits of Inspection. During the year I made 238 visits of inspection to animal quarters on vessels and 373 visits to various parts of the Island to inspect coolers, inoculate dairy cattle in connection with licences to sell milk and also for the purpose of making tests for contagious abortion in cattle.

Tuberculin Test. Of 1449 cattle subjected to this test 30 reacted. The total tested shows a decrease of 21 as compared with 1935, with an increase of 8 in the number of reactors. It was decided not to subject the cattle in Somerset to this test, as for the past 5 years there has not been a reactor in this parish. The test for contagious abortion was substituted. These cattle will be subjected to the Tuberculosis test in 1937. In Warwick and Southampton cattle were subjected to both tests. In Paget, Pembroke and Devonshire it is purposed to subject the cattle to both tests in 1937.

Test for Contagious Abortion. From 523 cattle subjected to this test, the following results were obtained in various parishes.

(a) Somerset. A total of 163 cattle were examined, 9 examinations being repeated after a lapse of six months. Of these original examinations 132 (81%) showed no agglutination, 4 (2.45%) agglutinated to a titre of 1/25, 14 (8.6%) to a titre of 1/50, 2 (1.25%) to a titre of 1/125 and 11 (6.7%) to a titre of 1/250.

In the repeated examinations, one showing no agglutination re-acted to a titre of 1/25 and another to a titre of 1/50. Of those formerly agglutinating to a titre of 1/50, two showed no agglutination, one had fallen to a titre of 1/25 and one remained stationary. One which

had agglutinated to a titre of 1/125 fell to 1/50 and the two agglutinating to a titre of 1/250 remained constant.

(b) Southampton. A total of 189 cattle were examined, of which 15 were re-examined. Of the original examinations 97 (51.5%) showed no agglutination. 21 (11.1%) agglutinated to a titre of 1/25, 35 (18.5%) agglutinated to a titre of 1/50, 16 (8.5%) agglutinated to a titre of 1/125 and 20 (10.4%) agglutinated to a titre of 1/250.

In the repeated examinations two showing no agglutination previously, remained constant and one re-acted to a titre of 1/25; one formerly agglutinating to a titre of 1/25 remained constant and two showed no agglutination. Of those agglutinating to a titre of 1/125 one remained constant and two re-acted to a titre of 1/25. Of those agglutinating to a titre of 1/250 one fell to a titre of 1/125.

(c) Warwick. A total of 157 cows were examined, 22 being re-examined. Of the original tests 98 (62.5%) showed no agglutination, 23 (14.6%) agglutinated to a titre of 1/25, 28 (17.8%) agglutinated to a titre of 1/50, 3 (1.9%) agglutinated to a titre of 1/125 and 5 (3.2%) agglutinated to a titre of 1/250

In the repeated examinations one showing no agglutination remained constant, four which had agglutinated to a titre of 1/25 showed no agglutination, six which had agglutinated to a titre of 1/50 agglutinated to 1/25 and three remained constant; one which had agglutinated to a titre of 1/125 fell to a titre of 1/50 and one showed no agglutination; two which had agglutinated to a titre of 1/250 remained constant.

Condition of Dairy Stock. The general condition continues about the same as last year. The number of scrub Bulbs has increased, due to lack of better-bred bulls.

Farmers' Market. The market was visited weekly with the exception of the two weeks when I was on leave. The general conditions have improved.

Private Markets. The coolers of the various private markets were inspected frequently and the conditions found to be improved and quite satisfactory.

Horse Show. The Military Command Horse show on the exhibition grounds was well conducted and well attended.

Cruelty to Animals. Professional evidence was given in 8 cases prosecuted by the Police: a decrease of 3 cases compared with 1935.

Record of Movements. I was absent on leave from 7th to 22nd October, when I went to the United States on private business.

Respectfully submitted,
C. J. COOPER
Government Veterinary-Officer.

Pembroke,
31st December 1936.

Appendix A.

REPORT ON THE BERMUDA BULB TRADE IN GREAT BRITAIN 1936.

The sales made in the past season were 15 per cent greater than the total for 1935. While this result is fairly satisfactory, it is not quite as good as we had hoped to see, when it is remembered that a reduction of prices was made with the express object of stimulating the trade. In this connection it should be explained that in the early months of the year several of the Producers expressed a very strong desire for larger business. As your Board knows, over a course of several years a great deal has been done to make the bulbs known and to develop the business, and there remained only the one untried way of accomplishing the end in view. It was explained to all concerned that a reduction of prices could only be regarded as an experiment, and, while the replies were not unanimous, the weight of opinion amongst the Growers in Bermuda was in favour of a trial being made.

Apart from the moderate measure of practical effect, the reduction has been of some value because it has provided confirmation of certain ideas which have been held for many years about this market. There is, for instance, the unfortunate preference of the large market growers for Japanese bulbs. As we have explained on several occasions, there is a period of two or three months, when their favourite black-stemmed Giganteum (or Takesima) is not available, during which they use Formosum, Erobu, Multiflorum etc. according to individual taste, and we have never quite lost the hope that at some time they might use a proportion of Harrisii for their Easter flowers. This year the Japanese shippers made a miscalculation, which converted an artificial shortage into a real shortage of Formosum and resulted in prices rising to the relatively high level of 40/-, for 300 bulbs size-7/9s, 55/- for 225-8/10s, 62/- for 200-9/10s, and so on. These advances, combined with our reductions, brought the prices of Formosum and Bermuda Harrisii a good deal nearer to each other than has been the case since the year of the Japanese earthquake. Despite this fact only one large nurseryman displayed any interest, and he did not place an order, although we quoted a very keen price.

Among the smaller local nurserymen, some progress has been made. Their methods, and the purposes for which they want their flowers, are usually not unsuited to Bermuda bulbs and a few shillings off the price is a consideration. This year some of them must have paid a good deal more than usual in recent years for their Formosum. It is likely that the full effect of the reduction has not yet been seen, and we think it will be worth continuing for another year. Since these customers use the 7/9″ size almost entirely, it can be done without prejudicing the higher price for the 9/11″ bulbs taken by Seedsmen.

Keen prices are also necessary for Continental orders. For reasons which it is unnecessary to detail, trade in all but necessaries is at a standstill in most European countries. It is some small satisfaction to record that in the present year an order was received from a firm in Holland for which we have been trying for several years. The lower prices made business possible, and we think it is a sign that there may be chances of extending trade on the Continent, whenever general conditions improve.

The trade among high-class retailers, who pass on the bulbs in small quantities to the public, hardly alters at all from year to year. The reduction of 2/6 per case of 9/11s makes no difference to their selling price (per

dozen), but it gave them a little more inducement to push the bulbs. Seeing that it made no noticeable change in the quantities sold, we are inclined to think that nothing very much can have been missed in past years. Nowadays the number of people who grow plants under glass is limited, and unfortunately the Harrisii has many rivals in the numerous hardy lilies which have been developed and put on the market. However, despite its limitations, this part of the sales is steady and remunerative; and therefore it is to be supposed that the good reputation of Bermuda lilies, and the attractive displays made at regular seasons, will lead to a gradual increase in facilities for growing.

No serious complaints were received about the deliveries of 1935. The only fault noticed was a rather large percentage of plants showing slight twisting of the foliage. Experts seem to be far from agreed about the cause of it, and we can only mention that it is certainly a detraction. It can also be a serious embarrasment, because on occasion buyers have used it as lever for engineering claims for failures which may very well have been due to causes arising from their own fault.

Some of the bulbs shipped this year were on the small side, but otherwise they looked perfectly good and fresh. One curious point, which we are at a loss to understand, is that on average the boxes weighed more than usual. As this increased the cost of carriage, some of them were reweighed, but it only confirmed the fact. Possibly the wood used was heavier, certainly the boxes all seemed strong.

We were interested to see two boxes, sent by the Department this autumn for an exhibition at the Chelsea Show of next year, in which the only packing material was grease-proof paper. If this could be used generally, it would mean a great saving in weight, and probably 1/6 to 2/- per box in the cost of rail carriage. The fact that the bulbs were rather dry in appearance was probably due to the lateness of the season rather than to anything in the packing. In other respects, they were in perfect condition, and actually fewer scales were knocked off than is usual in sand. We recommend that a further trial of a larger number of boxes should be made next year in order to see whether this alternative method could be adopted with safety.

The customary displays were made, and that in Hyde Park was especially good. As in previous years, thanks are due to Mr. Burn for his capable handling of his prize scheme among Horticultural Societies; and to Mr. Ogilvie for his ungrudging help in clearing up various scientific matters.

ROBERT TUCKER & CO.

London, 16th November, 1936.

Appendix B.

RAINFALL RECORDED AT AGRICULTURAL STATION, 1936.

January	3.15	inches
February	6.23	"
March	8.05	"
April	5.38	"
May	4.28	"
June	4.09	"
July	2.22	"
August	3.39	"
September	5.42	"
October	4.39	"
November	4.79	"
December	3.85	"
Total	55.24	inches

RAINFALL FOR LAST FIVE YEARS

1931	50.67	inches
1932	53.32	"
1933	46.22	"
1934	56.67	"
1935	64.85	"

C. V. S. EARLY,

Station Foreman.

5th March, 1937.

Appendix C.

FINANCIAL STATEMENTS.

(a) EXPENDITURE (Exclusive of Personal Emoluments) for the Year Ended 31st December, 1936.

General Grant

Appropriated by Act No. 50 of 1935				£1,300	0	0
Labour for experimental plots, lawns, flower-beds, roads, live stock etc	£1,133	16	4			
Seed Potatoes and other seed	22	15	11			
Prison Labour	9	13	9			
Cartage and Ploughing	3	6	6			
Manure and fertilisers	22	15	6			
Live stock – feed, bedding and incidentals	36	3	7			
Repairs and renewals of buildings, tools, etc.	18	17	5			
Printing	50	0	0			
Unexpended Balance	2	11	0			
	£1,300	0	0	£1,300	0	0

Inspection Services, Market Investigations and Contingencies

Appropriated by Act No. 50 of 1935				£ 800	0	0
Inspection of vegetables at dock and at Packing Houses	£ 112	5	6			
Representation in Canada	200	0	0			
Advertising in Canada	98	2	8			
Advertising lily bulbs in England, including cost of bulbs and fee to representative	122	2	0			
Printing in connection with shipping of vegetables	11	11	6			
Subscriptions to periodicals	1	7	11			
Cables	34	4	2			
Unexpended Balance	220	6	3			
	£ 800	0	0	£ 800	0	0

Control of Animal Diseases.

Appropriated by Act No. 50 of 1935				£ 180	0	0
Appropriated by Supplementary Grant No. 28 of 1936				100	0	0
Appropriated by Supplementary Grant No. 4 of 1937				12	0	0
Compensation to owners of condemned stock	£ 278	0	0			
Supplies and contingencies	13	15	2			
Unexpended Balance		4	10			
	£ 292	0	0	£ 292	0	0

Control of Plant Diseases and Pests.

Appropriated by Act No. 50 of 1935					£	150	0	0
Labour	£	23	10	3				
Fungicides and insecticides		28	7	2				
Repairs to Spraying Machine		7	12	10				
Hose		35	14	5				
Gasolene, etc.		36	5	9				
Printing		10	8	2				
Subscriptions to periodicals		5	9	9				
Unexpended Balance		2	11	8				
	£	150	0	0	£	150	0	0

Horticulture.

Appropriated by Act No. 50 of 1935					£	150	0	0
Labour	£	69	5	3				
Repairs and renewals of glass-houses, tools, etc.		25	0	3				
Seeds, bulbs and plants		11	4	4				
Fertilisers, etc.		7	16	9				
Printing		11	8	2				
Subscriptions to periodicals		3	0	6				
Unexpended Balance		22	4	9				
	£	150	0	0	£	150	0	0

Departmental Contingencies.

Appropriated by Act No. 50 of 1935					£	120	0	0
Local Travelling Expenses, Bicycle Allowances, etc.	£	22	14	8				
Stationery and other Office supplies		43	0	9				
Printing		10	14	6				
Foreign Postage		5	0	0				
Repairs to typewriter		1	13	0				
Lighting and Power		13	0	2				
Telephones		14	8	8				
Unexpended Balance		9	8	3				
	£	120	0	0	£	120	0	0

Packing House, Services and Contingencies.

Appropriated by Act No. 50 of 1935							£4,000	0 0
Chains for Grading Machine				£	9	14 1		
Packing House Supplies:								
Wrappers	£286	11	2					
Receipts	33	10	0					
Labels	204	0	3					
Nails	45	16	10					
Hatchets	9	8	3		579	6 6		
Labour: Pasting labels, making crates, grading, packing, etc.					1,938	4 3		
Labour: Construction					32	6 5		
Electric Current — light and power					29	0 7		
Telephones (2)					8	0 0		
Rental Southampton Packing Site					12	0 0		
Repairs to buildings and machinery					25	1 1		
Cartage of Packed Vegetables					313	16 3		
Cold Storage of Vegetables					217	4 0		
Insurance of Packing Houses					33	12 0		
Printing and Stationery					25	9 8		
Unexpended Balance					776	5 2		
				£4,000	0	0	£4,000	0 0

Purchase of Spraying Machines.

Appropriated by Act No. 50 of 1935							£ 250	0 0
Purchase of "Empire" Machine				£	108	15 7		
Assembling Machine					1	10 0		
Purchase of "Friend" Machine					107	16 0		
Assembling Machine					3	6 8		
Unexpended Balance					28	11 9		
				£	250	0 0	£ 250	0 0

(b) REIMBURSEMENTS TO GOVERNMENT

Sale of vegetables	£	72	7 6
vegetable plants		7	15 0
ornamental plants		30	13 6
spraying material		3	17 4
Seedmen's licences		2	5 0
Packing House Receipts:			
Charges for packing, grading, material and labour on crates		1,413	9 11
Overpayment for Packing Material		101	4 2
Rail freight from Southampton		68	12 1
W. R. Evans, Imprest Account, unexpended		113	0 8
	£	1,813	5 2

(c) FARMERS' MARKET.

Received for hire of Stalls				£	193	5	8
Rental of Market	£	91	0	7			
Lighting		8	16	10			
Painting etc.		10	16	11			
Balance		82	11	4			
	£	193	5	8	£	193	5	8

NORA E. HOLLIS,
Clerk, Board of Agriculture.

10th March 1936.

DISPOSAL OF PRODUCE, 1936.

Milk and vegetables to King Edward VII Memorial Hospital	£	25	2	0
Vegetables etc. to H. M. Jail		13	15	11
Vegetables and Plants donated to Bazaars		28	13	10
Plants donated to Arbor Societies, etc.		52	3	0
	£	119	14	9

PRISON LABOUR, 1936.

Prisoners present during year..... 742 men days.

C. V. S. EARLY,
Station Foreman.

Appendix D.

SUMMARY OF BYE-LAWS IN FORCE 31st DECEMBER 1936. REGULATING THE IMPORTATION OF PLANTS.

Bye-Laws made by the Board of Agriculture on 28th April, 1936 under provisions of The Boards Act, 1920.

(i) All plants and bulbs imported from other countries are subject to inspection by the Plant Pathologist, or other responsible officer of the Department of Agriculture, and are fumigated or otherwise treated at his discretion.

(ii) The importation of certain species of plants is prohibited and that of other species is permitted only under certain conditions as shown in the following tables.

A. Absolute prohibitions.

Plants and bulbs prohibited	Country of origin
Banana plants and parts thereof except fruit	All countries.
Citrus plants and parts thereof except fruit.	Bahamas and West Indies
Carrots	All countries.
Irish Potatoes	Great Britain and Ireland, Europe, Newfoundland, St. Pierre and Miquelon.
Sweet Potatoes	All countries.
Maize, broom corn and other sorghums, sugar cane.	All countries.
Bulbs and plants of **Lilium**	All countries.
Raw Vegetables (exc. onions) and fresh fruit.	Countries where **Bactrocera cucurbitae** is known to occur.

B. Conditional Prohibitions.

Plants etc. prohibited	Condition
Banana fruits	Unless imported without wrapping, cover, or packing of any kind.
Narcissus bulbs	Unless imported under licence previously obtained from Director of Agriculture or Plant Pathologist, and treated with hot water prior to entry.

B. **Conditional Prohibitions.**—(Continued).

Plants etc. prohibited	Condition
Seed potatoes and all Chili Garnet and Bliss Triumph potatoes	Unless conforming to seed-potato Bye-Laws.
Soil or plants growing in soil	Unless imported under licence previously obtained from Director of Agriculture or Plant Pathologist.
Plant material (including cut-flowers) arriving by air-service	Unless imported under licence previously obtained from Director of Agriculture or Plant Pathologist.

Appendix E.

LICENSED VETERINARIANS.

R. L. Tucker, D.V.S.
C. J. Cooper, V.S.
J. W. Sutherland, B.V.Sc.

LICENSED SHIPPERS OF PRODUCE.

A. C. Benevides
J. M. Darrell
Henry Dunkley & Co.
The Hill Co.
O. R. Loblein, Ltd.
Pearman, Watlington & Co.
Manuel F. Simons (kale to United States of America).

LICENSED FARMER-SHIPPERS.

F. A. Hollis
Malcolm Hollis
M. F. King & Son
Gabriel Jacome
M. S. Madeiros
E. J. Moniz
J. DeMoura
Bento Oliviera & Son
E. W. Outerbridge
J. R. Outerbridge
D. C. Robinson
M. F. Simons
P. B. Stephens
J. DaCosta Da Silva
K. A. Wilkinson
R. B. Watson

LICENSED LILY SHIPPERS

T. O. Covel
Henry & Lee
Malcolm Hollis
W. G. Hollis
E. W. Outerbridge Co.
J. R. Outerbridge
H. E. D. Smith

AGRICULTURAL STATION.

The Agricultural Station is within twenty minutes walk of Hamilton Post Office, and is situated in Paget on Point Finger Road near the King Edward VII Memorial Hospital.

At the Station may be seen many trees, shrubs and other plants, the majority of which are labelled, and also experimental plots for vegetables.

The offices of the Department of Agriculture are situated at the Agricultural Station, and are open from 7 a.m. to 5 p.m., Sundays excepted.

GOVERNMENT PACKING HOUSES.

Two Government Packing Houses are situated at the Agricultural Station and one at Evans Bay Railway Station, Southampton. At these, farmers' produce is graded and packed for shipment.

FARMERS' MARKET, HAMILTON.

The Farmers' Market, Front Street, Hamilton, is under the supervision of the Department and applications to sell therein should be made to the Inspector of Produce.

The Market is open from 7 a.m. to 5 p.m. (10 p.m. on Saturdays) on all days except Sundays and holidays.

INSPECTOR'S OFFICE.

The office of the Inspector of Produce is situated at No. 1 Shed (ground floor), Front Street, Hamilton.